FIG. 1

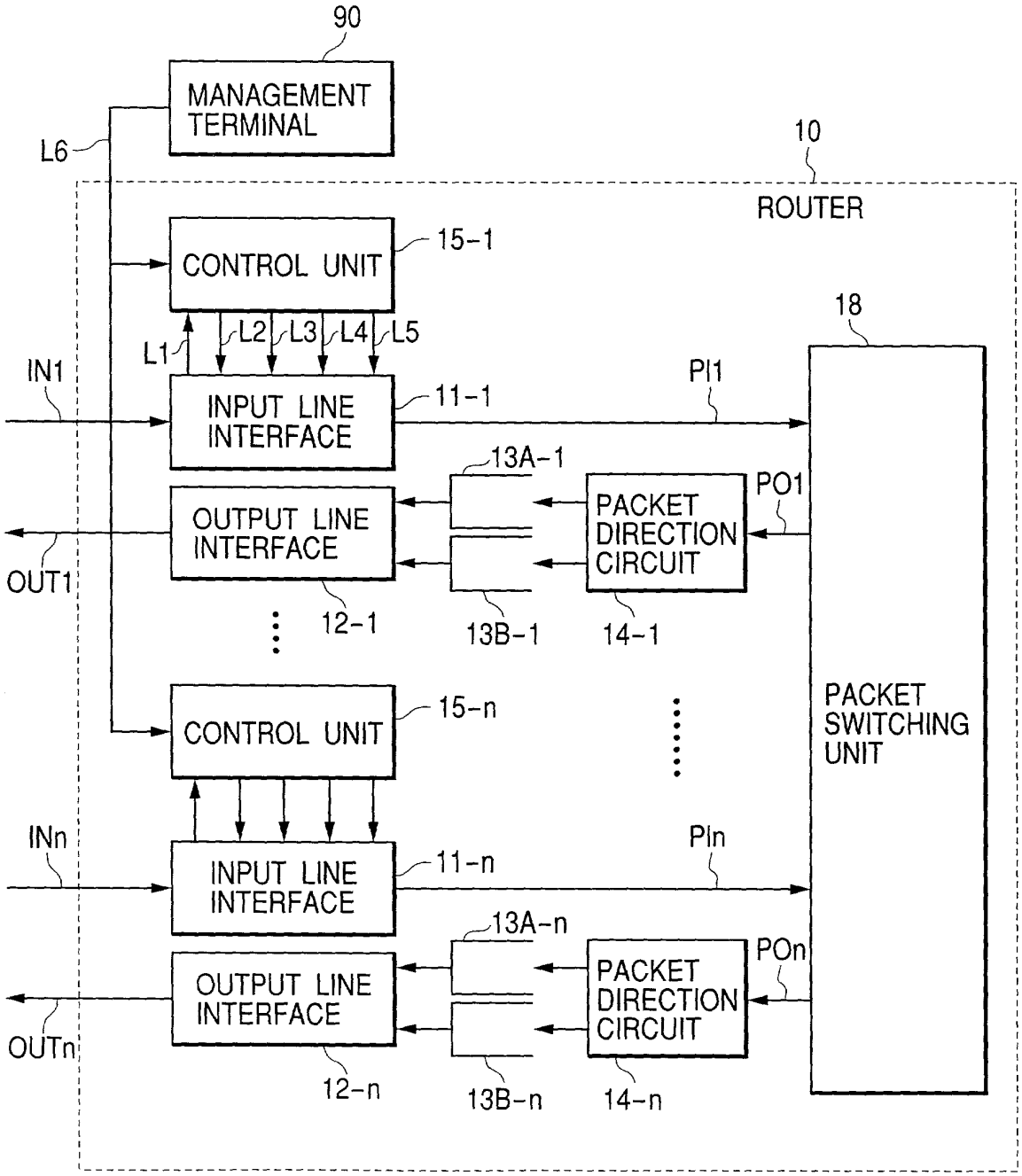

90
MANAGEMENT TERMINAL
L6
10
ROUTER
CONTROL UNIT
15-1
18
L1
L2
L3
L4
L5
IN1
INPUT LINE INTERFACE
11-1
PI1
13A-1
PO1
PACKET DIRECTION CIRCUIT
OUTPUT LINE INTERFACE
OUT1
12-1
13B-1
14-1
CONTROL UNIT
15-n
PACKET SWITCHING UNIT
INn
INPUT LINE INTERFACE
11-n
PIn
13A-n
POn
PACKET DIRECTION CIRCUIT
OUTPUT LINE INTERFACE
OUTn
12-n
13B-n
14-n

FIG. 2

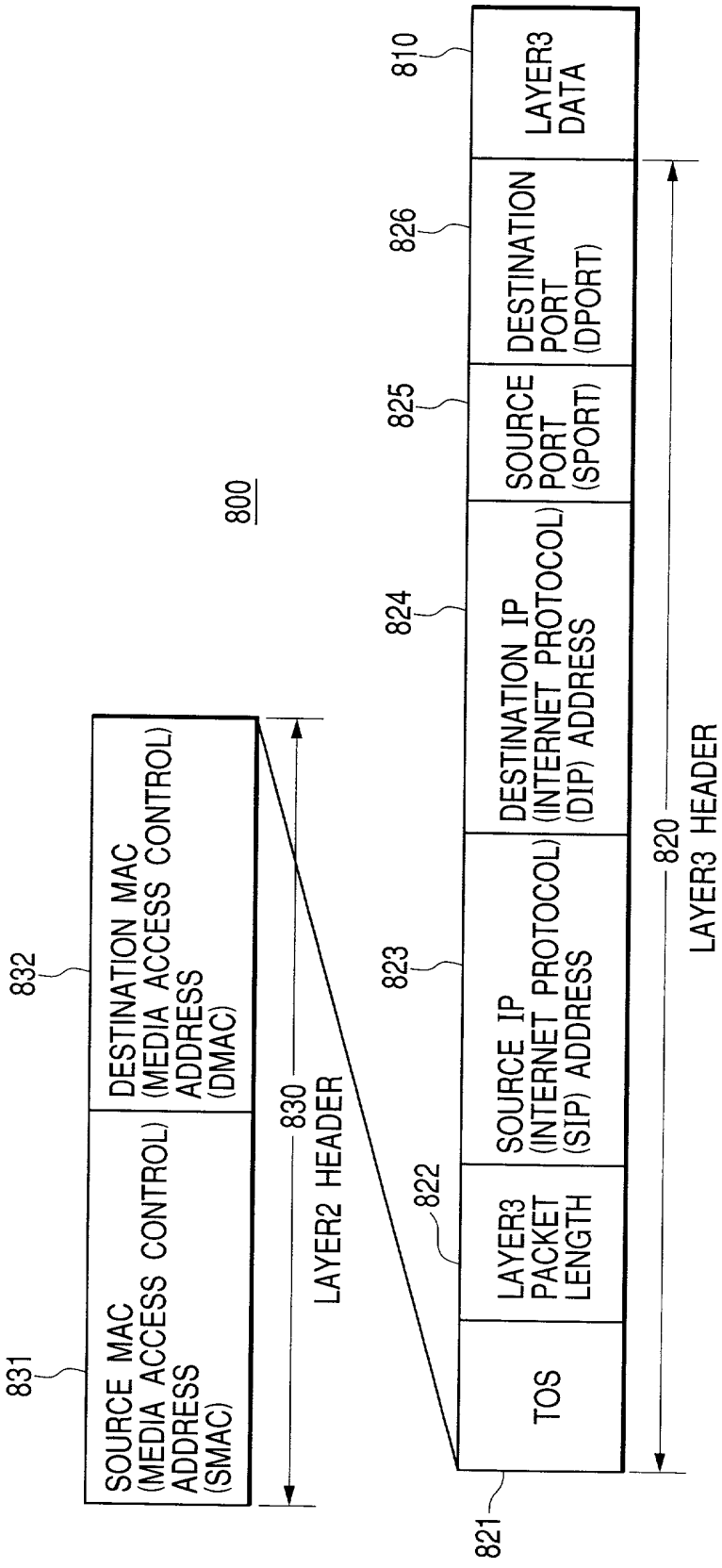

800
831
SOURCE MAC (MEDIA ACCESS CONTROL) ADDRESS (SMAC)
832
DESTINATION MAC (MEDIA ACCESS CONTROL) ADDRESS (DMAC)
830
LAYER2 HEADER
821
TOS
822
LAYER3 PACKET LENGTH
823
SOURCE IP (INTERNET PROTOCOL) (SIP) ADDRESS
824
DESTINATION IP (INTERNET PROTOCOL) (DIP) ADDRESS
825
SOURCE PORT (SPORT)
826
DESTINATION PORT (DPORT)
810
LAYER3 DATA
820
LAYER3 HEADER

FIG. 3

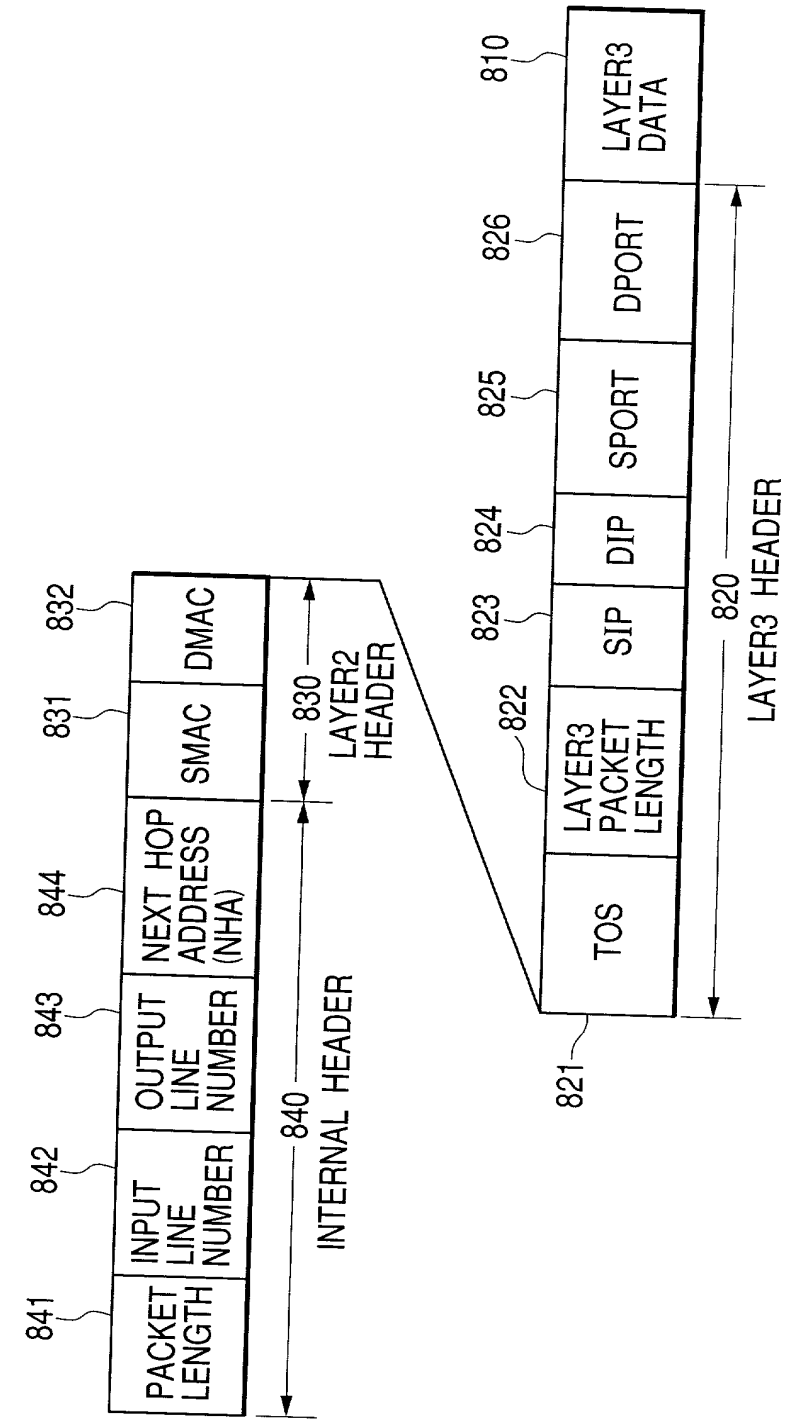

801
PACKET LENGTH
INPUT LINE NUMBER
OUTPUT LINE NUMBER
NEXT HOP ADDRESS (NHA)
SMAC
DMAC
841
842
843
844
831
832
840 INTERNAL HEADER
830 LAYER2 HEADER
TOS
LAYER3 PACKET LENGTH
SIP
DIP
SPORT
DPORT
LAYER3 DATA
821
822
823
824
825
826
810
820 LAYER3 HEADER

FIG. 4

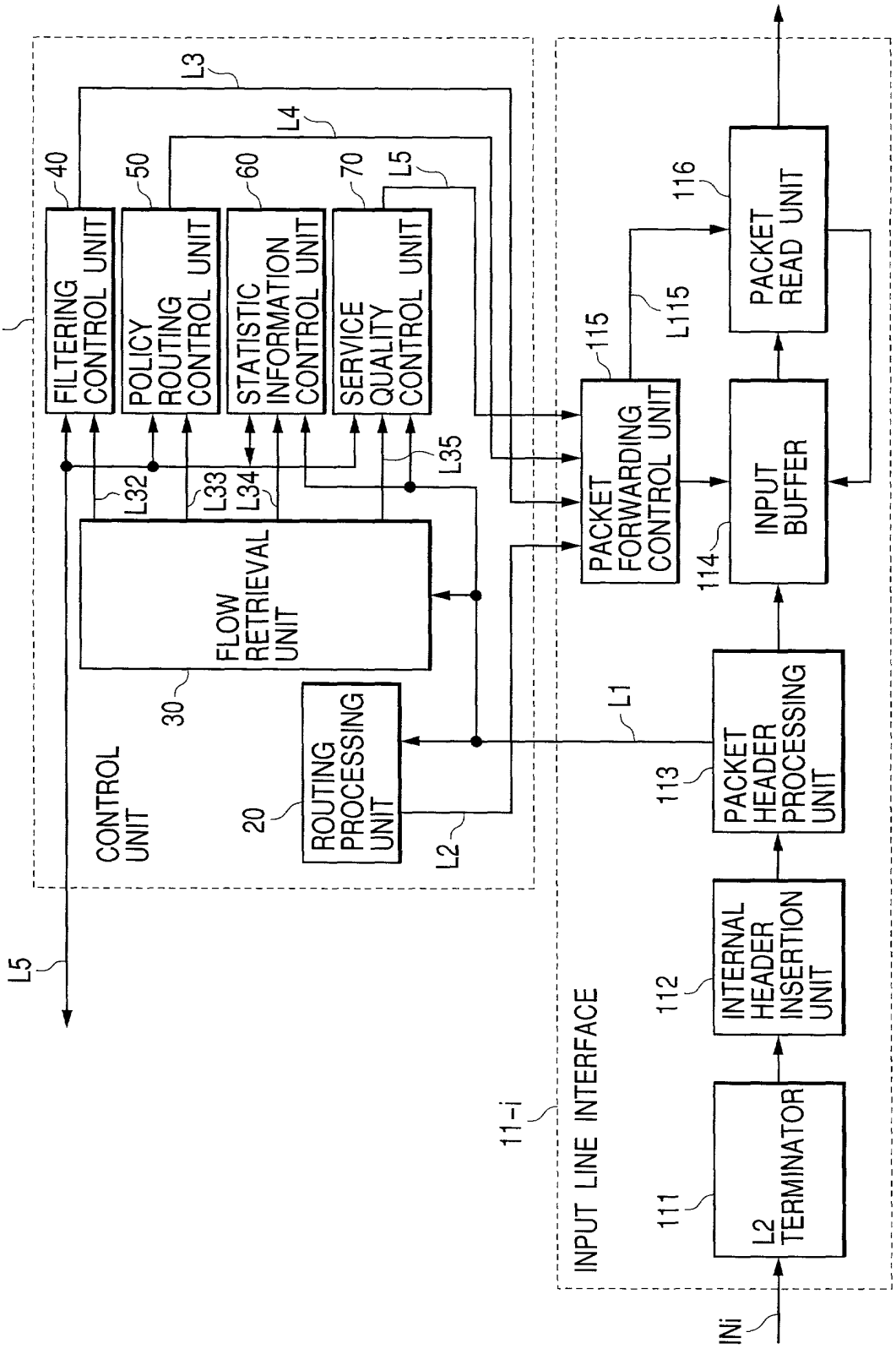

INi
INPUT LINE INTERFACE
11-i
111
L2 TERMINATOR
112
INTERNAL HEADER INSERTION UNIT
113
PACKET HEADER PROCESSING UNIT
114
INPUT BUFFER
115
PACKET FORWARDING CONTROL UNIT
116
PACKET READ UNIT
L115
L1
L2
L3
L4
L5
L32
L33
L34
L35
15-i
CONTROL UNIT
20
ROUTING PROCESSING UNIT
30
FLOW RETRIEVAL UNIT
40
FILTERING CONTROL UNIT
50
POLICY ROUTING CONTROL UNIT
60
STATISTIC INFORMATION CONTROL UNIT
70
SERVICE QUALITY CONTROL UNIT
L5

FIG. 5

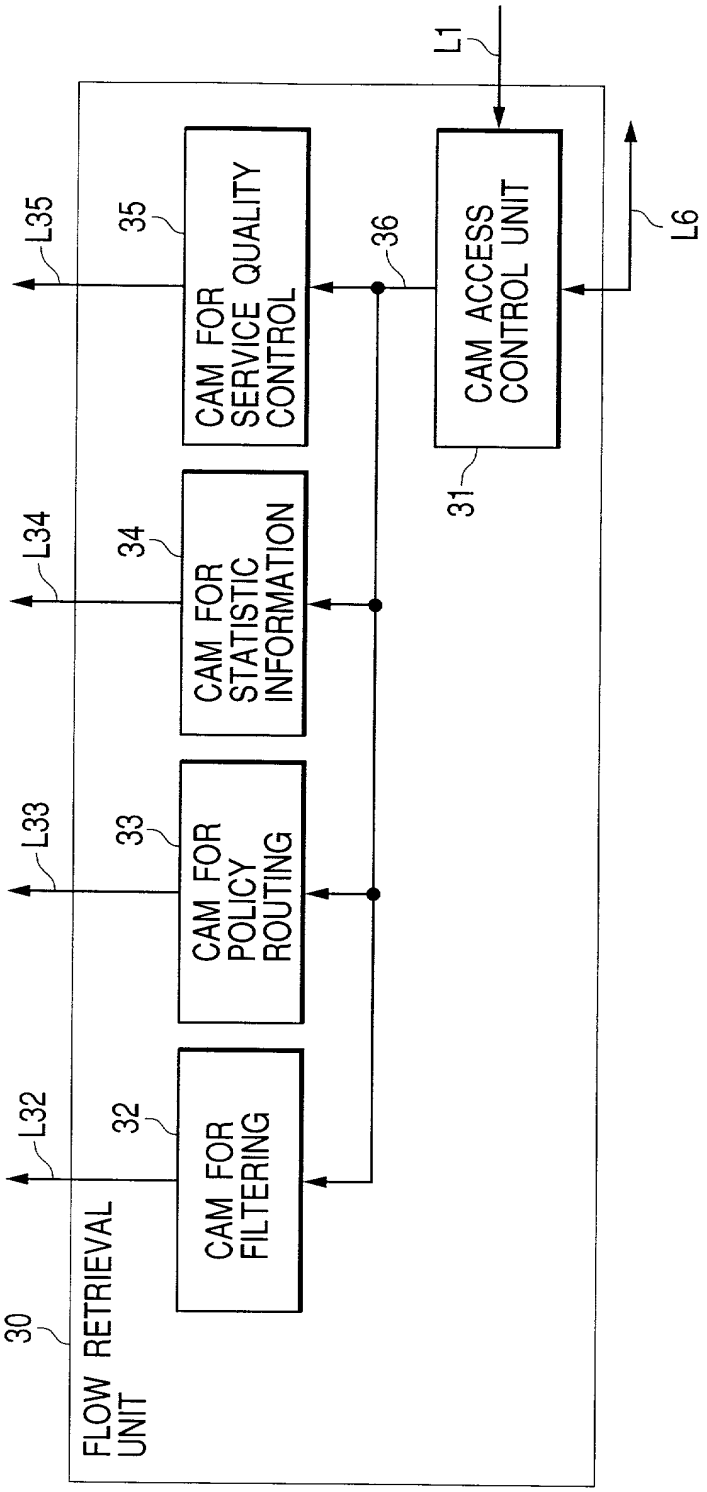

L1
L6
L35
35
CAM FOR SERVICE QUALITY CONTROL
36
CAM ACCESS CONTROL UNIT
31
L34
34
CAM FOR STATISTIC INFORMATION
L33
33
CAM FOR POLICY ROUTING
L32
32
CAM FOR FILTERING
30
FLOW RETRIEVAL UNIT

FIG. 6

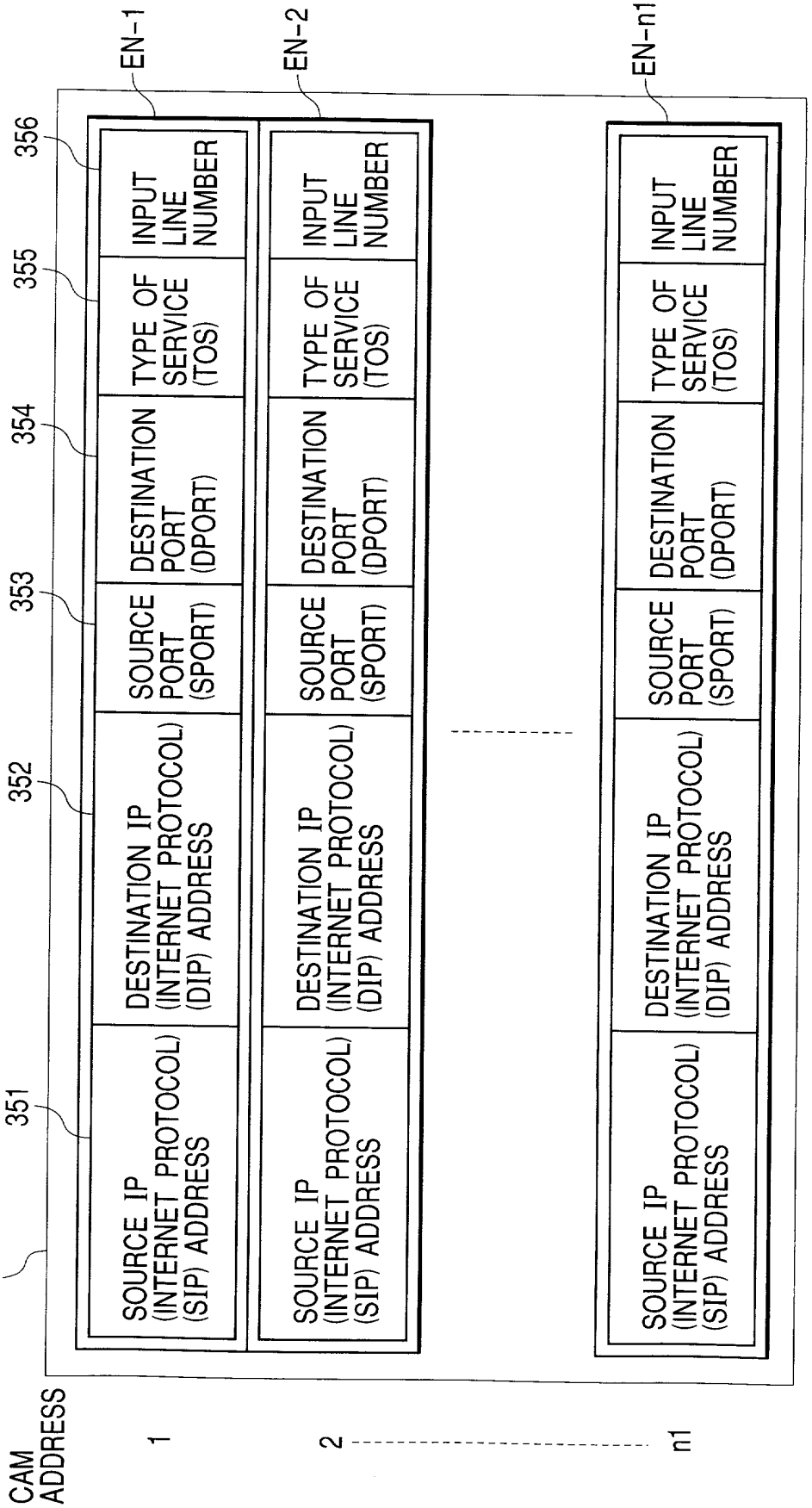

CAM ADDRESS
1
2
n1
35
351
352
353
354
355
356
SOURCE IP (INTERNET PROTOCOL) (SIP) ADDRESS
DESTINATION IP (INTERNET PROTOCOL) (DIP) ADDRESS
SOURCE PORT (SPORT)
DESTINATION PORT (DPORT)
TYPE OF SERVICE (TOS)
INPUT LINE NUMBER
EN-1
EN-2
EN-n1

FIG. 7

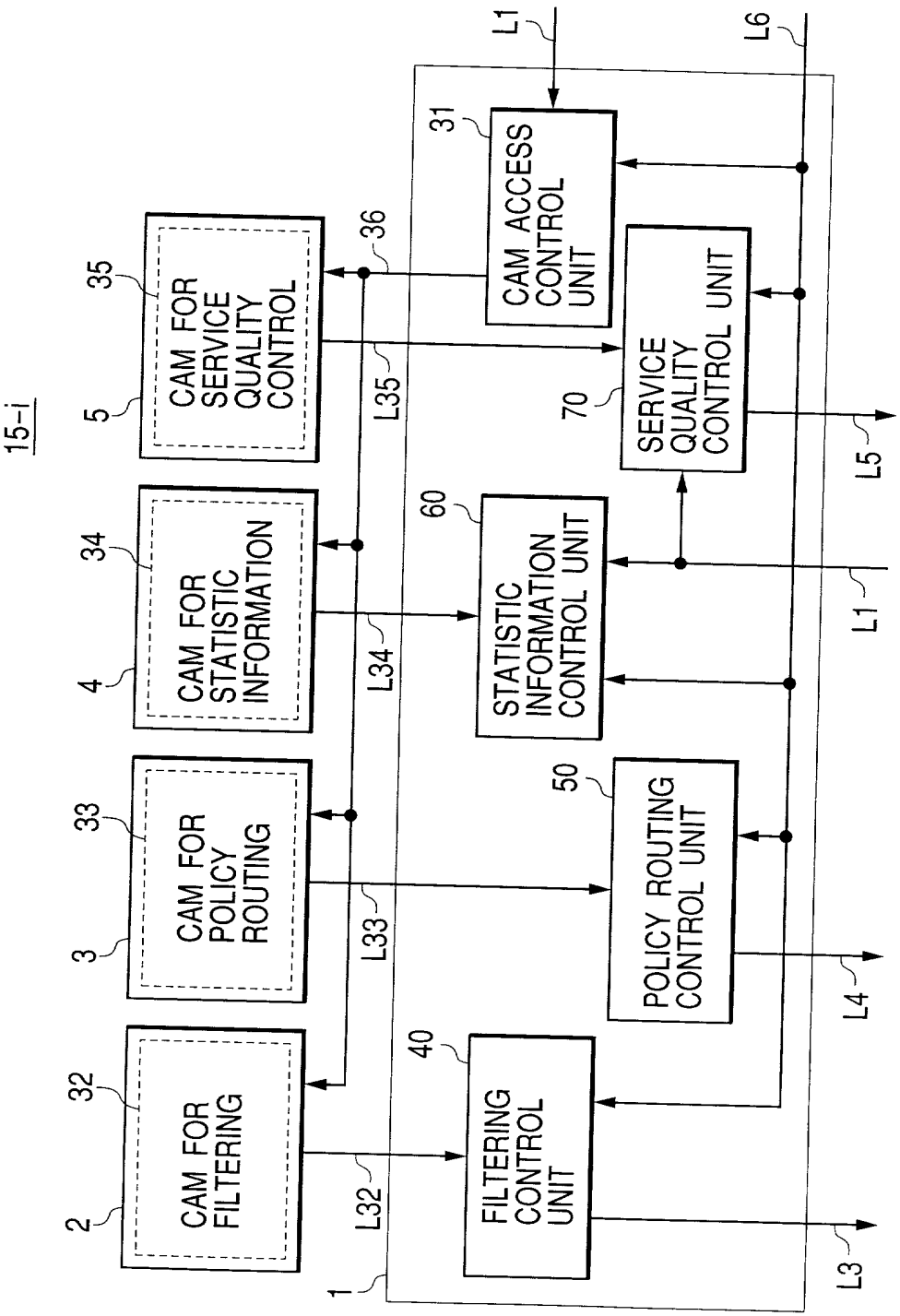

15-i
CAM FOR FILTERING
CAM FOR POLICY ROUTING
CAM FOR STATISTIC INFORMATION
CAM FOR SERVICE QUALITY CONTROL
CAM ACCESS CONTROL UNIT
FILTERING CONTROL UNIT
POLICY ROUTING CONTROL UNIT
STATISTIC INFORMATION CONTROL UNIT
SERVICE QUALITY CONTROL UNIT
1
2
3
4
5
31
32
33
34
35
36
40
50
60
70
L1
L3
L4
L5
L6
L32
L33
L34
L35

FIG. 8

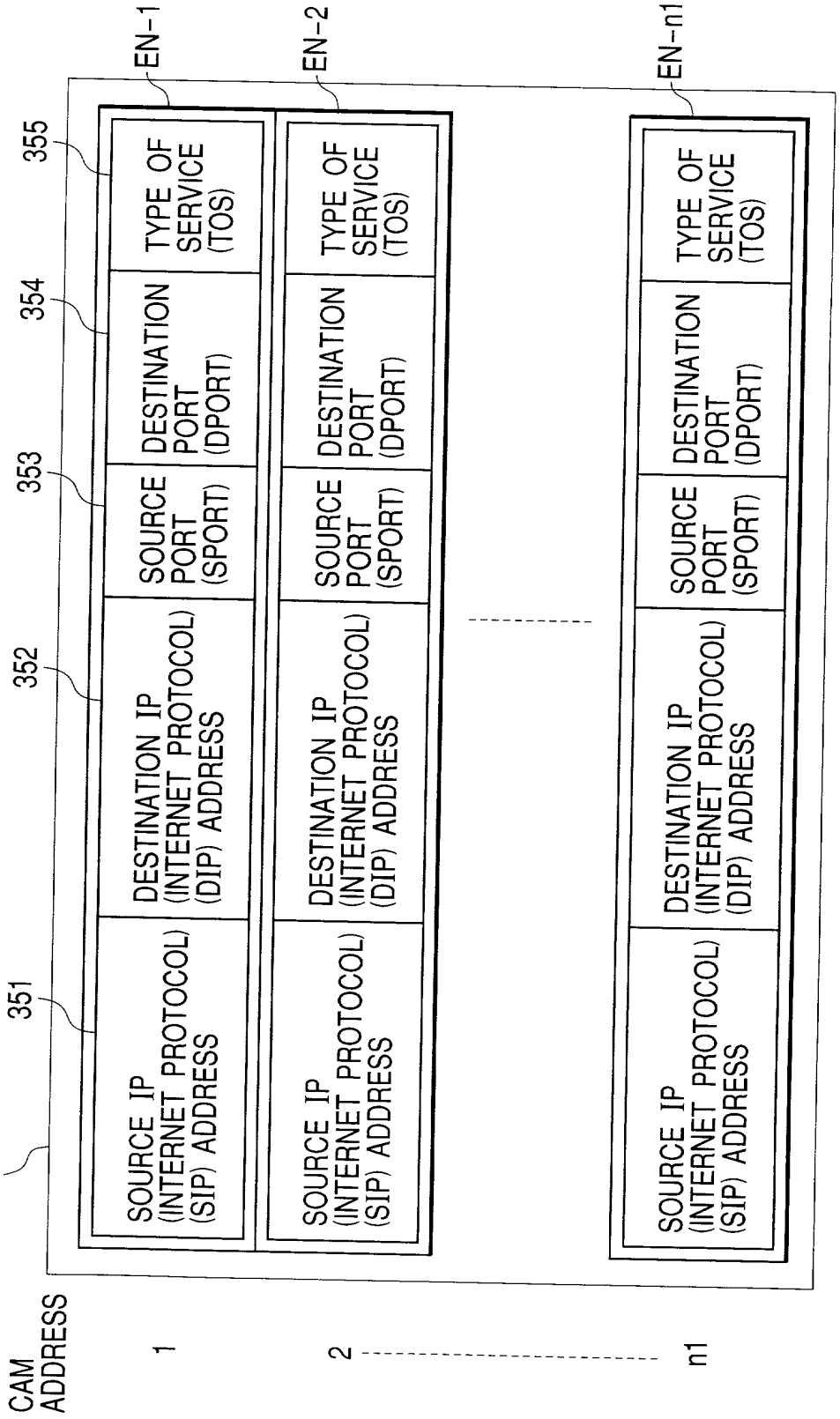

CAM ADDRESS
1
2
n1
35
351
352
353
354
355
EN-1
EN-2
EN-n1
SOURCE IP (INTERNET PROTOCOL) (SIP) ADDRESS
DESTINATION IP (INTERNET PROTOCOL) (DIP) ADDRESS
SOURCE PORT (SPORT)
DESTINATION PORT (DPORT)
TYPE OF SERVICE (TOS)

FIG. 9

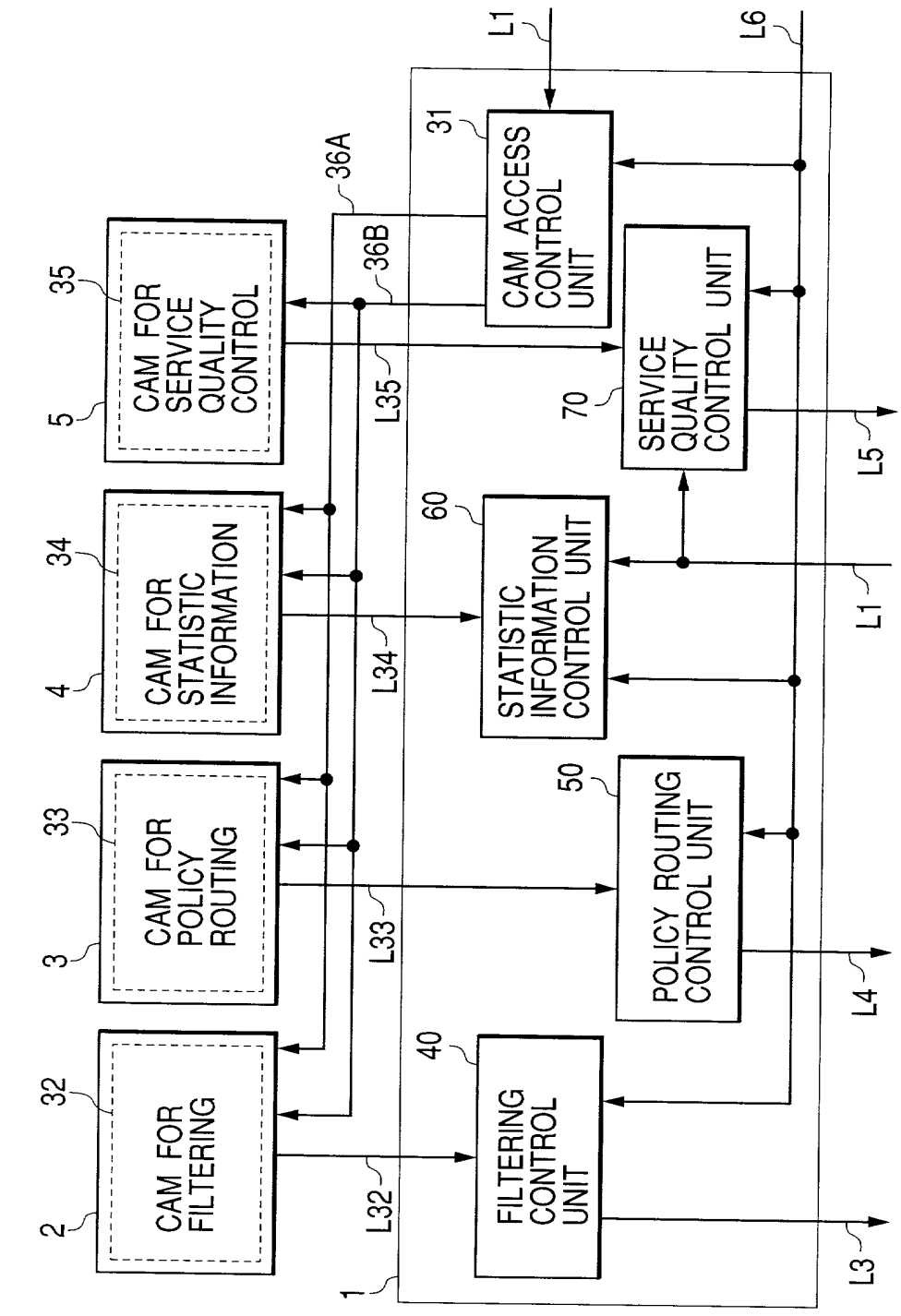

15-i
CAM FOR FILTERING
CAM FOR POLICY ROUTING
CAM FOR STATISTIC INFORMATION
CAM FOR SERVICE QUALITY CONTROL
CAM ACCESS CONTROL UNIT
FILTERING CONTROL UNIT
POLICY ROUTING CONTROL UNIT
STATISTIC INFORMATION CONTROL UNIT
SERVICE QUALITY CONTROL UNIT
1
2
3
4
5
31
32
33
34
35
36A
36B
40
50
60
70
L1
L3
L4
L5
L6
L32
L33
L34
L35

FIG. 10

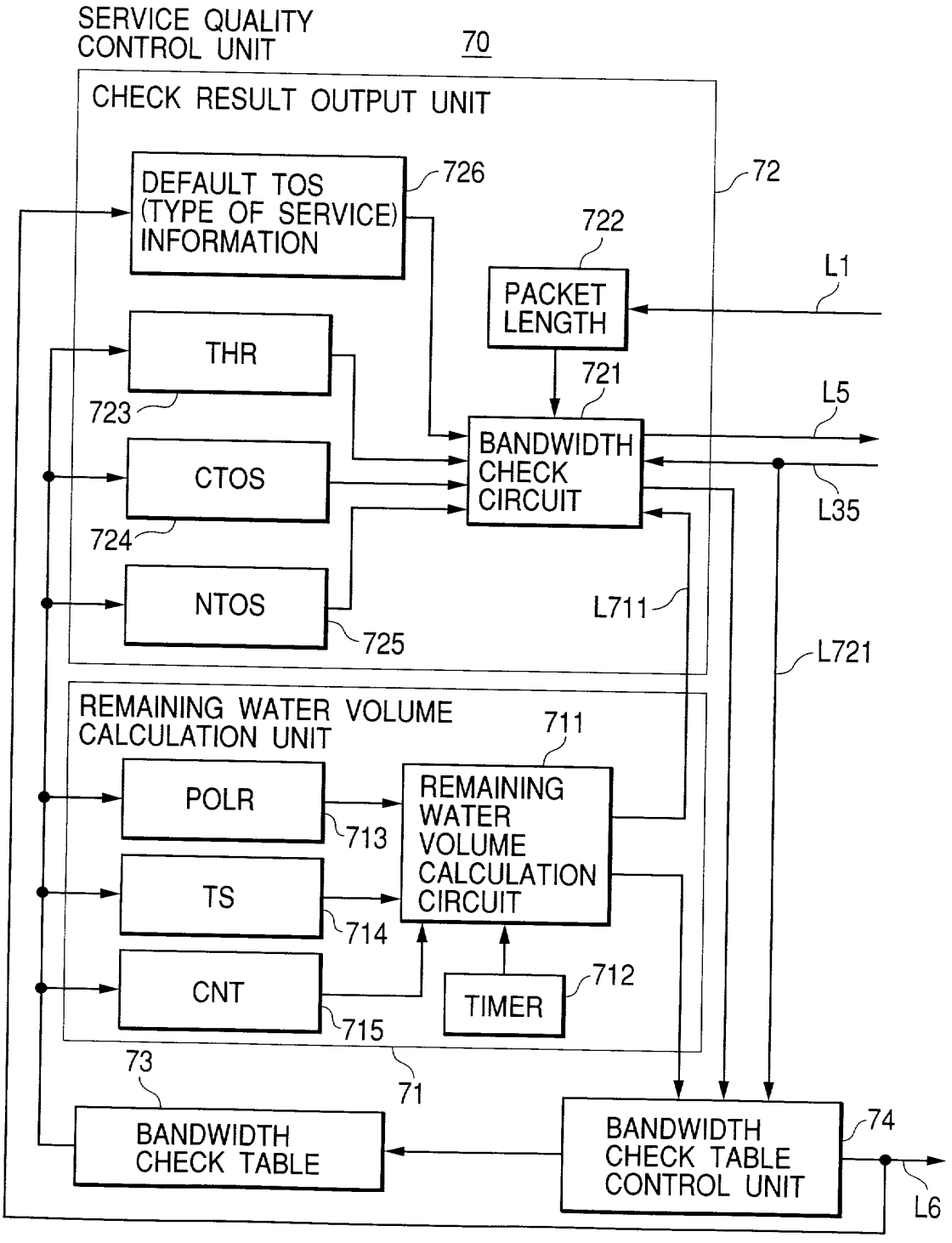

SERVICE QUALITY CONTROL UNIT
70
CHECK RESULT OUTPUT UNIT
72
DEFAULT TOS (TYPE OF SERVICE) INFORMATION
726
722
PACKET LENGTH
L1
THR
723
721
L5
BANDWIDTH CHECK CIRCUIT
CTOS
724
L35
NTOS
725
L711
L721
REMAINING WATER VOLUME CALCULATION UNIT
711
POLR
713
REMAINING WATER VOLUME CALCULATION CIRCUIT
TS
714
CNT
715
TIMER
712
71
73
BANDWIDTH CHECK TABLE
BANDWIDTH CHECK TABLE CONTROL UNIT
74
L6

FIG. 11

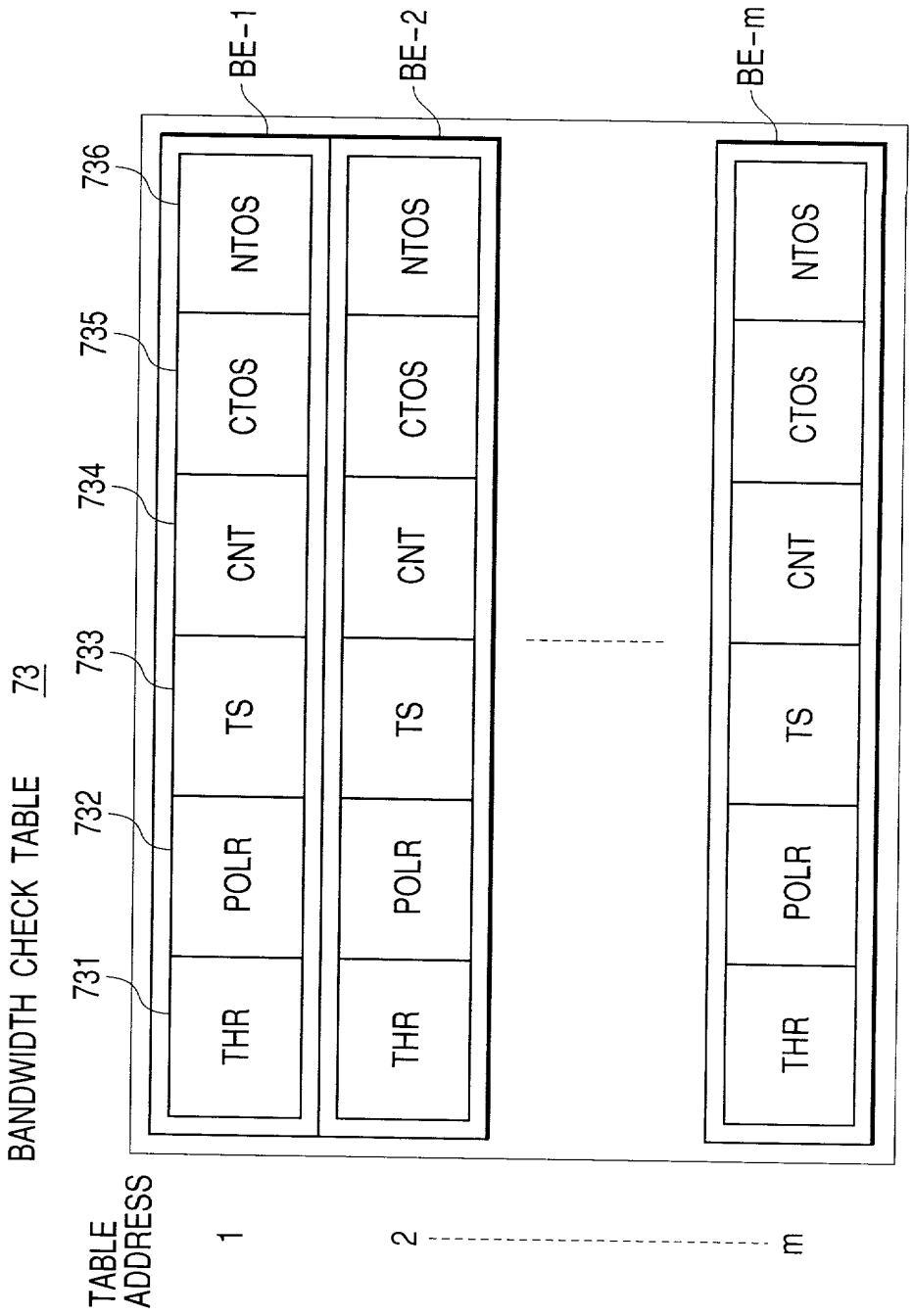

BANDWIDTH CHECK TABLE 73
TABLE ADDRESS
1
2
m
BE-1
BE-2
BE-m
731
732
733
734
735
736
THR
POLR
TS
CNT
CTOS
NTOS

FIG. 12

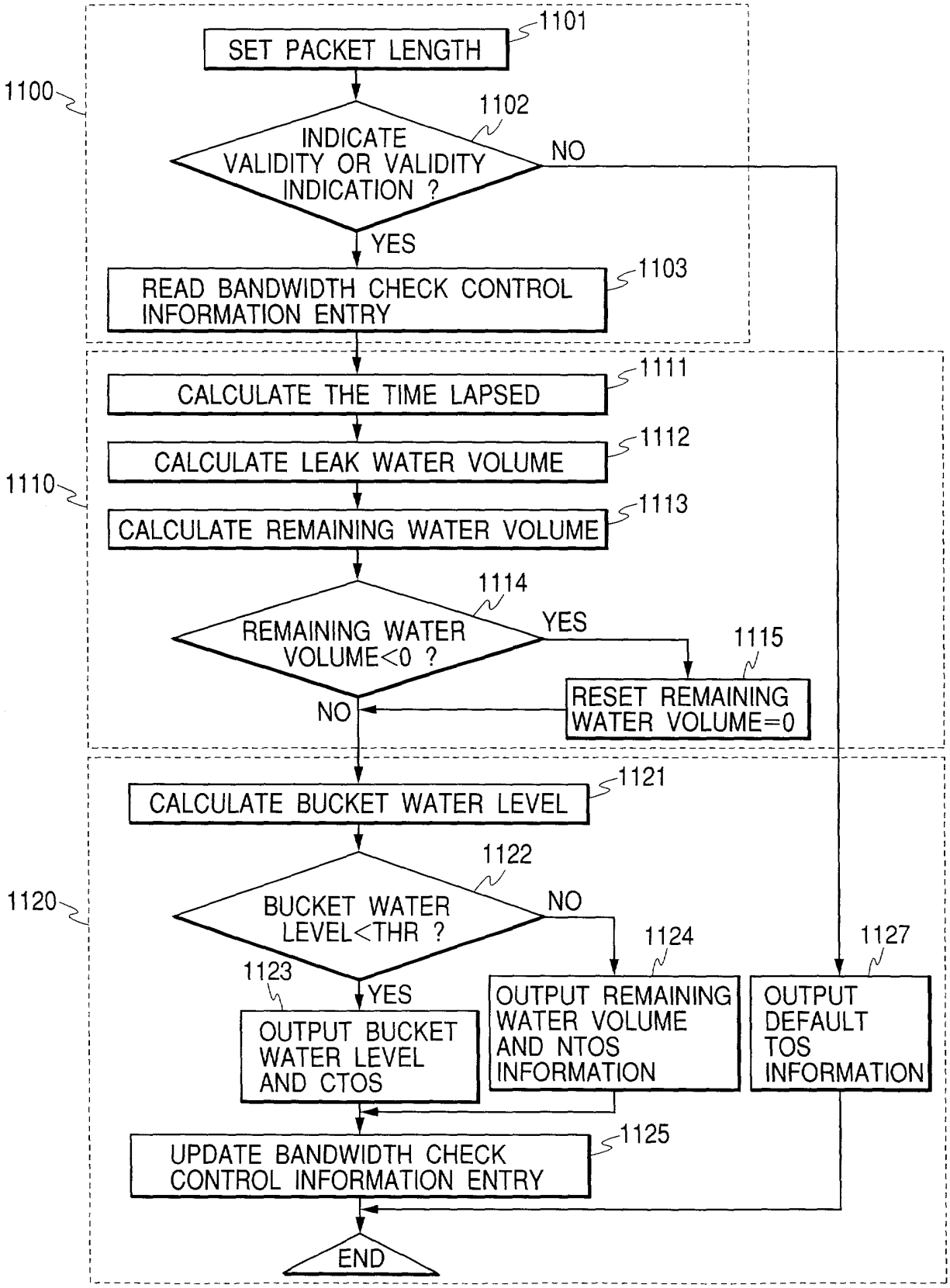

1100
SET PACKET LENGTH
1101
INDICATE VALIDITY OR VALIDITY INDICATION ?
1102
NO
YES
READ BANDWIDTH CHECK CONTROL INFORMATION ENTRY
1103
1110
CALCULATE THE TIME LAPSED
1111
CALCULATE LEAK WATER VOLUME
1112
CALCULATE REMAINING WATER VOLUME
1113
REMAINING WATER VOLUME<0 ?
1114
YES
NO
RESET REMAINING WATER VOLUME=0
1115
1120
CALCULATE BUCKET WATER LEVEL
1121
BUCKET WATER LEVEL<THR ?
1122
NO
YES
1123
OUTPUT BUCKET WATER LEVEL AND CTOS
OUTPUT REMAINING WATER VOLUME AND NTOS INFORMATION
1124
OUTPUT DEFAULT TOS INFORMATION
1127
UPDATE BANDWIDTH CHECK CONTROL INFORMATION ENTRY
1125
END

FIG. 13

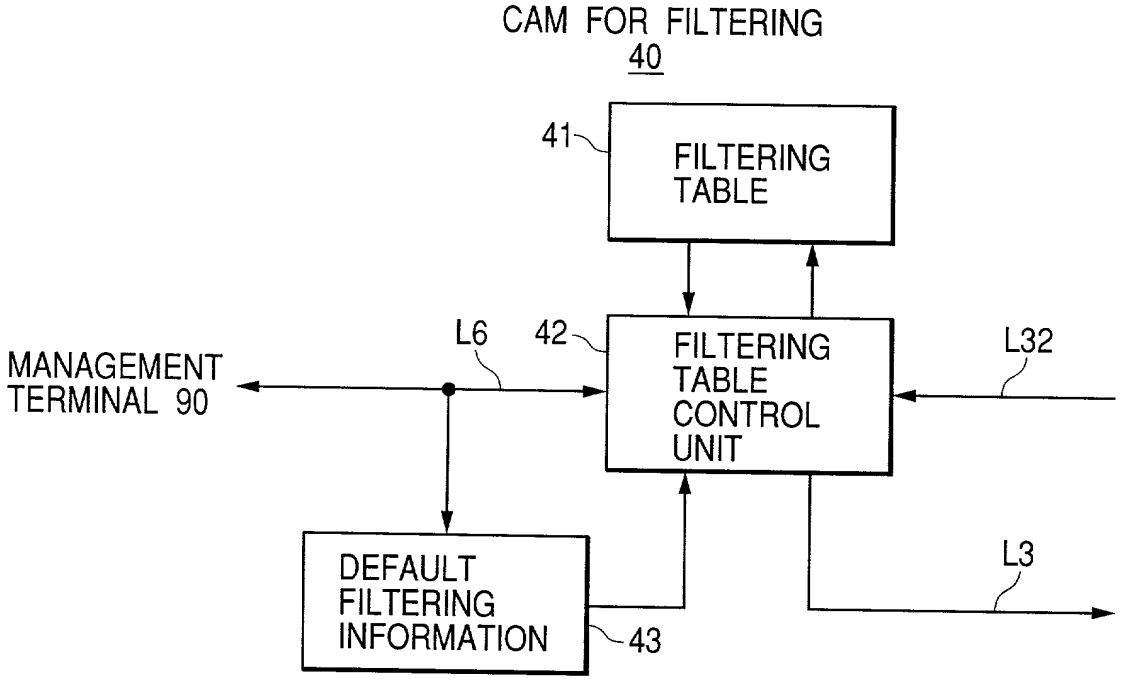

CAM FOR FILTERING
40
41
FILTERING TABLE
L6
42
FILTERING TABLE CONTROL UNIT
L32
MANAGEMENT TERMINAL 90
DEFAULT FILTERING INFORMATION
43
L3

FIG. 14

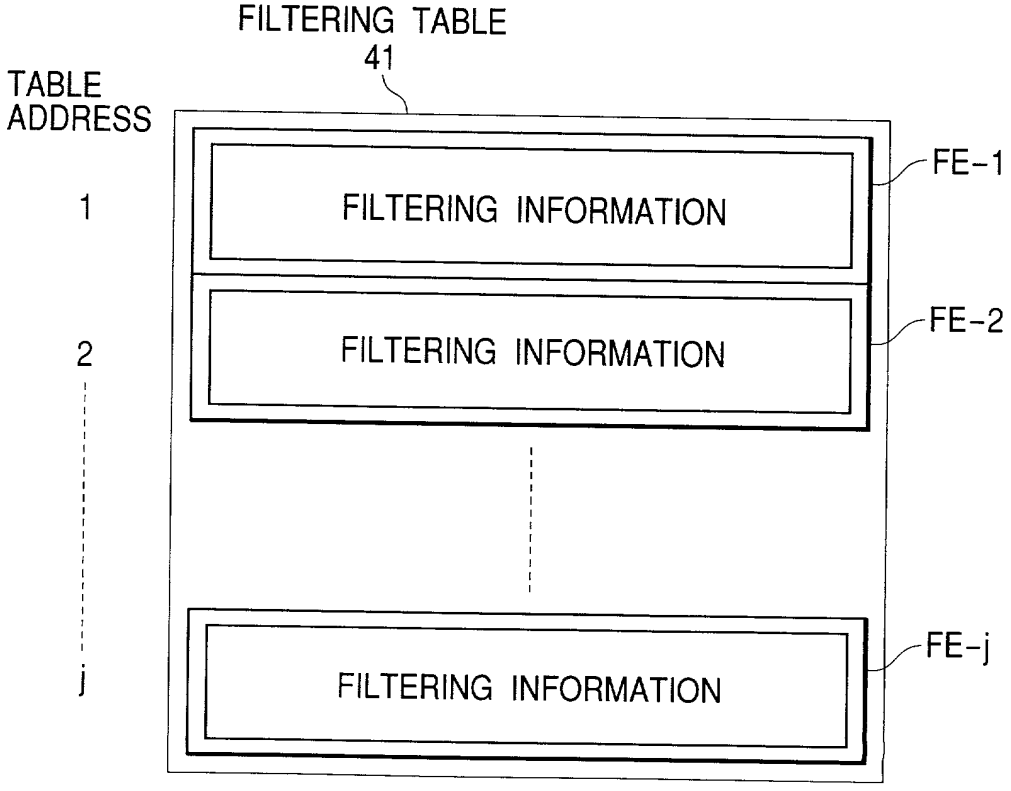

FILTERING TABLE
41
TABLE ADDRESS
1
2
j
FILTERING INFORMATION
FE-1
FILTERING INFORMATION
FE-2
FILTERING INFORMATION
FE-j

FIG. 15

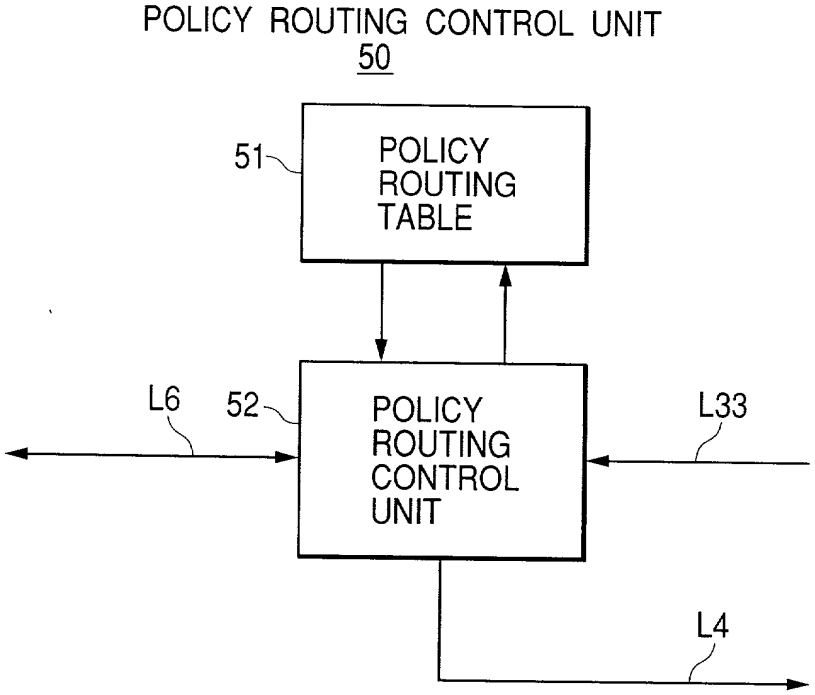

POLICY ROUTING CONTROL UNIT
50
51
POLICY ROUTING TABLE
L6
52
POLICY ROUTING CONTROL UNIT
L33
L4

FIG. 16

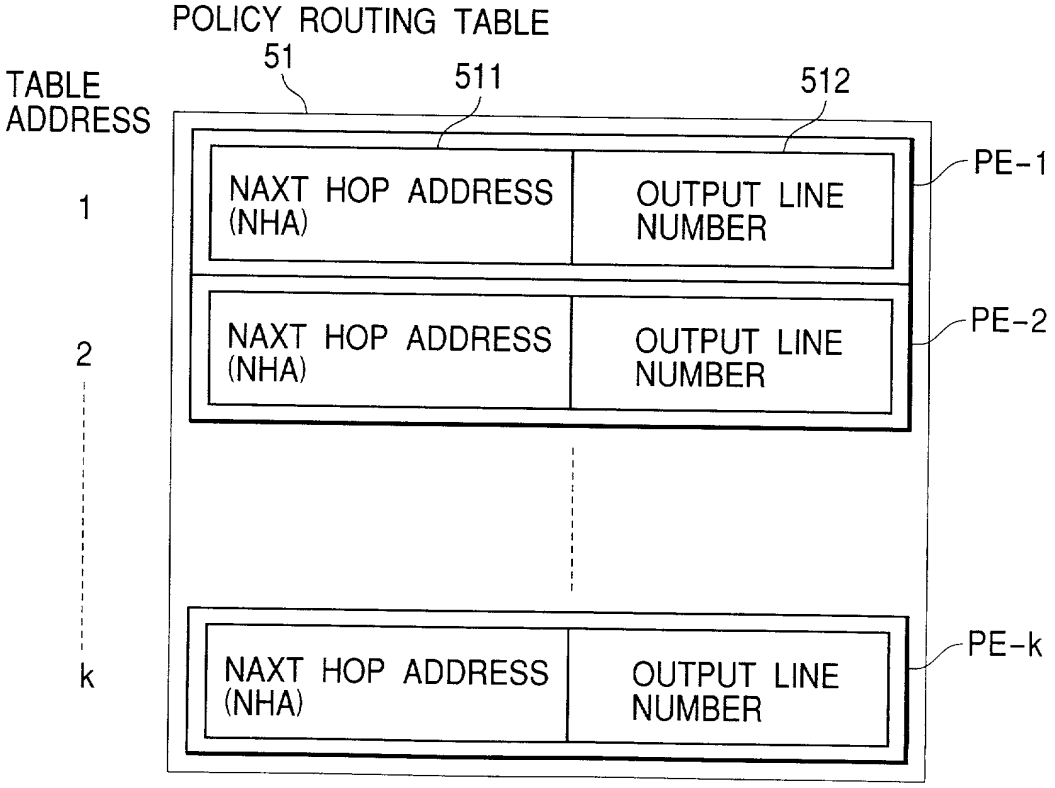

POLICY ROUTING TABLE
51
511
512
TABLE ADDRESS
1
2
k
NAXT HOP ADDRESS (NHA)
OUTPUT LINE NUMBER
PE-1
PE-2
PE-k

FIG. 17

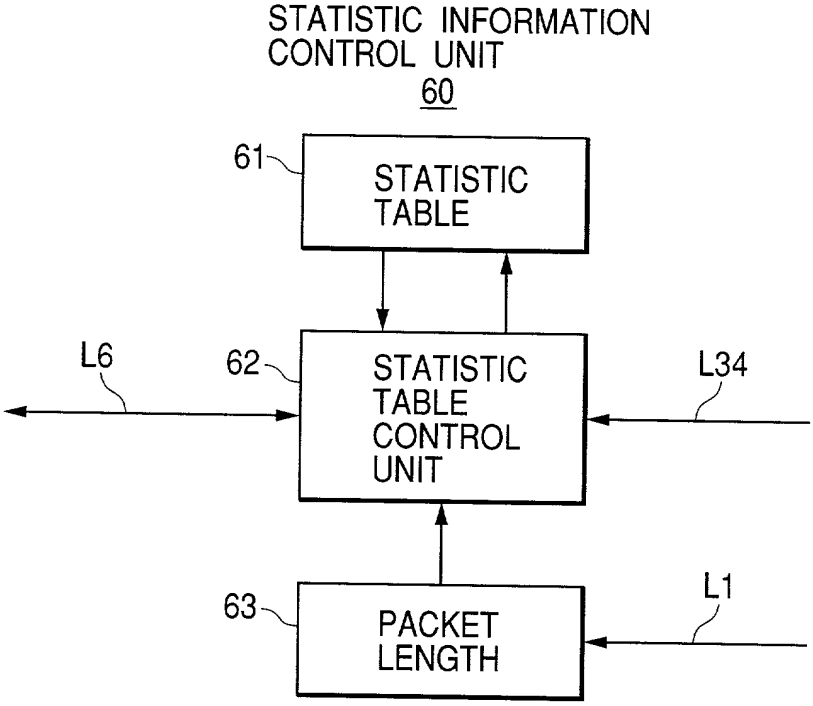

STATISTIC INFORMATION CONTROL UNIT
60
61
STATISTIC TABLE
L6
62
STATISTIC TABLE CONTROL UNIT
L34
63
PACKET LENGTH
L1

FIG. 18

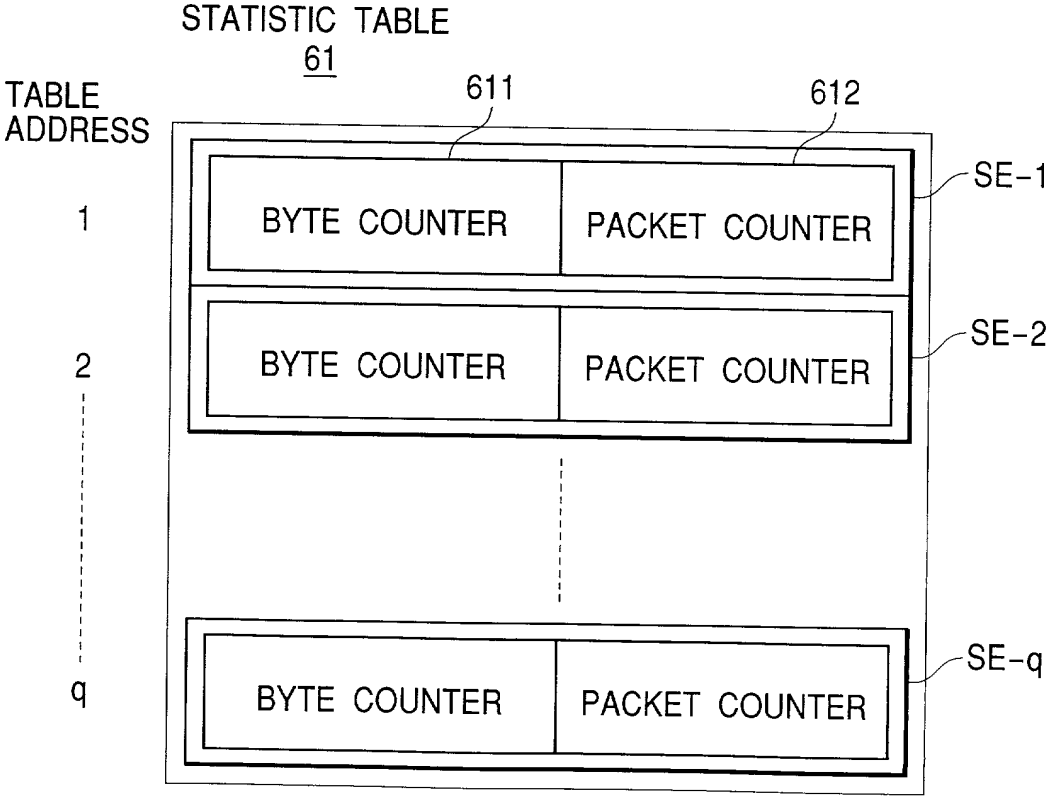
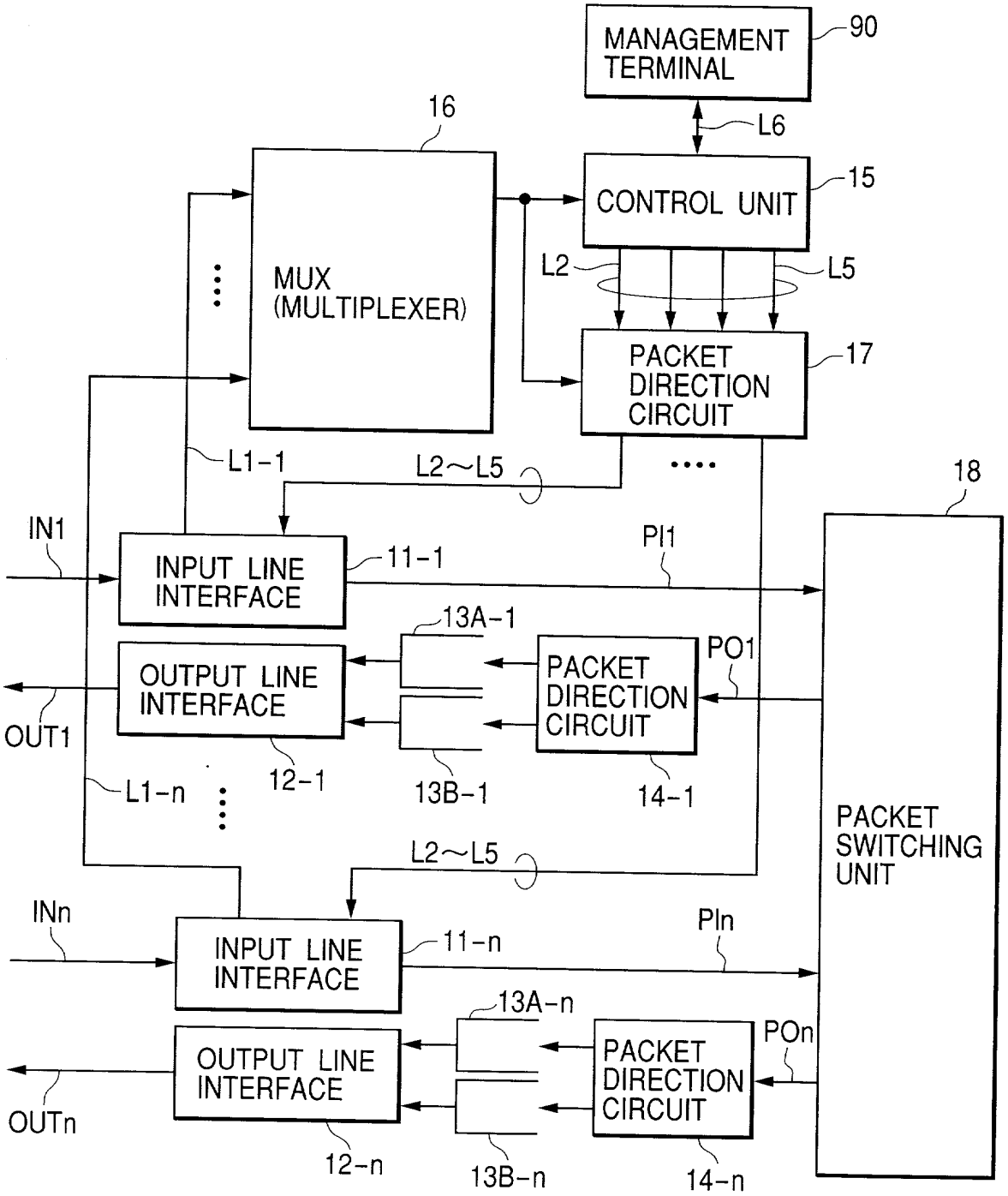

STATISTIC TABLE
61
TABLE ADDRESS
611
612
1
BYTE COUNTER
PACKET COUNTER
SE-1
2
BYTE COUNTER
PACKET COUNTER
SE-2
q
BYTE COUNTER
PACKET COUNTER
SE-q

FIG. 19


MANAGEMENT TERMINAL
90
L6
16
CONTROL UNIT
15
MUX (MULTIPLEXER)
L2
L5
PACKET DIRECTION CIRCUIT
17
L1-1
L2~L5
18
IN1
INPUT LINE INTERFACE
11-1
PI1
13A-1
PACKET DIRECTION CIRCUIT
PO1
OUTPUT LINE INTERFACE
OUT1
12-1
13B-1
14-1
L1-n
PACKET SWITCHING UNIT
L2~L5
INn
INPUT LINE INTERFACE
11-n
PIn
13A-n
POn
PACKET DIRECTION CIRCUIT
OUTPUT LINE INTERFACE
OUTn
12-n
13B-n
14-n